

# Research Paper Series

Analytical Studies Branch

*Differences in Innovator and Non-innovator Profiles: Small Establishments in Business Services*

by Guy Gellatly

No. 143

CA1  
BS1  
-2000  
R143





## **ANALYTICAL STUDIES BRANCH RESEARCH PAPER SERIES**

The Analytical Studies Branch Research Paper Series provides for the circulation, on a pre-publication basis, of research conducted by Branch staff, visiting Fellows and academic associates. The Research Paper Series is intended to stimulate discussion on a variety of topics including labour, business firm dynamics, pensions, agriculture, mortality, language, immigration, statistical computing and simulation. Readers of the series are encouraged to contact the authors with comments, criticisms and suggestions. A list of titles appears inside the back cover of this paper.

Papers in the series are distributed to Statistics Canada Regional Offices, provincial statistical focal points, research institutes, and specialty libraries. These papers can be downloaded from the internet at [www.statcan.ca](http://www.statcan.ca).

To obtain a collection of abstracts of the papers in the series and/or copies of individual papers (in French or English), please contact:

Publications Review Committee  
Analytical Studies Branch, Statistics Canada  
24th Floor, R.H. Coats Building  
Ottawa, Ontario, K1A 0T6  
(613) 951-6325

# **Differences in Innovator and Non-innovator Profiles: Small Establishments in Business Services**

by

Guy Gellatly

**No. 143**

**11F0019MPE No. 143**

**ISSN: 1200-5223**

**ISBN: 0-660-17986-5**

Micro-Economic Analysis Division  
24-B R.H. Coats Building  
Ottawa, K1A 0T6  
Statistics Canada  
(613) 951-3758  
Facsimile Number: (613) 951-5403  
Email: [gellguy@statcan.ca](mailto:gellguy@statcan.ca)

**December 1999**

This paper represents the views of the author and does not necessarily reflect the opinions of Statistics Canada.

*Aussi disponible en français*



Digitized by the Internet Archive  
in 2023 with funding from  
University of Toronto

<https://archive.org/details/31761116347683>



# Table of Contents

ABSTRACT.....	V
ACKNOWLEDGEMENTS.....	VII
1. INTRODUCTION.....	1
2. DATA SOURCE: SURVEY OF INNOVATION 1996 .....	2
3. INNOVATION IN BUSINESS SERVICES.....	3
4. DIFFERENCES BETWEEN INNOVATORS AND NON-INNOVATORS .....	4
4.1 <i>Comparing Innovators and Non-innovators</i> .....	4
4.2 <i>Strategic Differences Between Innovators and Non-innovators</i> .....	6
5. OBSTACLES TO INNOVATION.....	7
5.1 <i>Differences Between Innovators and Non-innovators</i> .....	8
5.2 <i>Multivariate Analysis</i> .....	9
5.2.1. <i>Firm Characteristics</i> .....	9
5.2.2. <i>Dependent Variables</i> .....	10
5.2.3. <i>Regression Analysis</i> .....	10
6. CONCLUSION .....	13
REFERENCES.....	14



## ***Abstract***

This paper explores differences between innovative and non-innovative establishments in business service industries. It focuses on small establishments that supply core technical inputs to other firms: establishments in computer and related services, engineering, and other scientific and technical services.

The analysis begins by examining the incidence of innovation within the small firm population. Forty percent of small businesses report introducing new or improved products, processes or organizational forms. Among these businesses, product innovation dominates over process or organizational change. A majority of these establishments reveal an ongoing commitment to innovation programs by introducing innovations on a regular basis. By contrast, businesses that do not introduce new or improved products, processes or organizational methods reveal little supporting evidence of innovation activity.

The paper then investigates differences in strategic intensity between innovative and non-innovative businesses. Innovators attach greater importance to financial management and capital acquisition. Innovators also place more emphasis on recruiting skilled labour and on promoting incentive compensation. These distinctions are sensible – among small firms in R&D-intensive industries, financing and human resource competencies play a critical role in the innovation process.

A final section examines whether the obstacles to innovation differ between innovators and non-innovators. Innovators are more likely to report difficulties related to market success, imitation, and skill restrictions. Evidence of learning-by-doing is more apparent within a multivariate framework. The probability of encountering risk-related obstacles and input restrictions is higher among establishments that engage in R&D and use intellectual property rights, both key elements of the innovation process. Many obstacles to innovation are also more apparent for businesses that stress financing, marketing, production or human resource strategies.

***Keywords:*** innovation, small firms, service industries







## *Acknowledgements*

The author is indebted to John Baldwin and Des Beckstead of the Micro-Economic Analysis Division at Statistics Canada for their many helpful comments and suggestions.



## 1. Introduction

Small firms play a central role in innovation systems. They overcome the inertia built into larger firms and capitalize on new technologies. They develop new products in the early stages of an industry's life-cycle when product standards are fluid, when production processes are in flux, when turnover is high, and when competition is based on new features.<sup>1</sup> This study focuses on small establishments in business service industries—computer and related services, engineering, and other scientific and technical services.<sup>2</sup> All of these industries are examples of dynamic services—they stress the development and integration of advanced technologies, and, through the dissemination of technological innovations, play a key role in supporting the production, distribution and innovation activities of other sectors.

It is the purpose of this paper to investigate three issues. First, we examine the incidence of innovation within small business service establishments. Innovation in this sector is important. New products developed in these industries are core business inputs—they provide the impetus for innovation and growth in other areas of the economy. Given the importance of advanced technology within business services, one may be tempted to conclude *a priori* that all establishments share a commitment to innovation. We find evidence to the contrary: innovation strategies are evident in only a minority of small businesses. This is consistent with the conceptual framework proposed by Baldwin and Gellatly (1998)—advanced competencies are more firm- than industry-specific. Even in highly dynamic sectors, innovation intensities are far from uniform.

The analysis then explores strategic differences between innovators and non-innovators in several key areas—marketing, management, production, human resources, and financing. Certain elements of financing, human resource, and marketing strategies are more important among innovators. Many of these strategies are strongly correlated with the innovation process.

Finally, we ask whether this innovator/non-innovator dichotomy stems from differences in the set of obstacles facing these two groups. Obstacles to innovation may reflect a variety of factors (e.g., market and technical risk, cost factors, corporate style). It may be the case that non-innovators face greater obstacles which preclude the development of innovation programs. An alternative view is that innovation represents a learning-by-doing process, with obstacles becoming more apparent to those that pursue innovation activities. In general comparisons between innovators and non-innovators, the former are more likely to stress obstacles pertaining to market success, imitation and labour skills. Multivariate analysis reveals greater evidence of learning-by-doing—obstacles are more evident in businesses that make substantial investments in the innovation process and in the development of certain strategic competencies.

---

<sup>1</sup> For a discussion of innovation in small firms, see Baldwin and Gellatly (1998).

<sup>2</sup> Computer and related services is comprised of two separate industry groups: computer services and computer equipment maintenance and repair.



## 2. Data Source: Survey of Innovation 1996

This study is based on Statistics Canada's *Survey of Innovation 1996*. The survey included a sample of 3830 establishments engaged in business services. The overall response rate in this sector was 88%.<sup>3</sup> Detailed firm-level data were collected on:

- elements of the innovation process (i.e., sources of innovative ideas, objectives of innovation activities, the impact of innovation on firm performance, the barriers to innovation);
- R&D activities;
- intellectual property use;
- business strategies (e.g., production, management, marketing, financing and human resources);
- competitive environment (e.g., sources of market uncertainty).

Respondents provided information on the above topics in several ways. For certain questions, responses were binary in nature (yes/no).<sup>4</sup> An establishment's innovation status was determined in this fashion. Businesses were asked:

- if they had offered any new or improved products (goods or services) to their customers;
- if they had introduced any new or improved processes to affect their supply of products;
- if they had made any significant improvements in terms of organizational structure or internal business routines.<sup>5</sup>

An affirmative response to any of the above items identified the business as an innovator. Alternatively, if the business answered 'no' to all three items, it was deemed a non-innovator.

For other questions, the business was asked to rate the significance of a particular factor on a five-point Likert scale ranging from 1 (low importance) to 5 (high importance). Respondents were also given the option of identifying the factor as 'not applicable'. The majority of questions pertaining to innovation activities, business strategies, and competitive conditions were structured in this manner.

In what follows, we focus exclusively on single-unit establishments within the business services sample that have less than 50 employees.<sup>6</sup> The vast majority of businesses within this target group, however, are very small—95% of these businesses have fewer than 20 employees.

---

<sup>3</sup> See Baldwin et al. (1998).

<sup>4</sup> For certain questions, respondents were also given a third option: (do not know).

<sup>5</sup> All of these pertain to the 1994-96 period.

<sup>6</sup> Single-unit establishments refer to those that are not legally related to other establishments in the sample. In all, 2536 units are used in the present analysis.

### ***3. Innovation in Business Services***

Forty percent of small businesses self-identify as innovators, that is, they report the introduction of new or improved products, processes, or organizational forms.<sup>7</sup> Among these businesses, product innovation constitutes the core activity (with 81% of innovators reporting new or improved goods or services), followed by process innovation (46% of innovators) and organizational innovation (33% of innovators).

Slightly less than half of all innovators (46%) report multiple forms of innovation activity. Of these, product and process combinations occur most frequently (19% of innovators), followed by comprehensive strategies that encompass product, process and organizational innovation (14% of innovators). Data on innovation intensities suggest a strong commitment to ongoing innovation programs within these businesses. Roughly 70% of small innovative establishments report introducing new products or processes, on average, at least once per year. Slightly less than half of all innovators (44%) report that they introduce multiple innovations during an average year. A sizeable minority, 26% of all innovative small establishments, generally introduce three or more innovations per year.

While the above characteristics reveal something of the success rate, they do not provide an exhaustive measure of innovation activity within small businesses. To obtain such a measure, we examined the incidence of non-commercialized innovation within both the innovative and non-innovative groups. These represent innovation activities that did not lead to the introduction of new or improved products or processes. While 36% of innovators report activities that did not result in an innovation, only 5% of non-innovators do so.<sup>8</sup> This reveals a population that divides into two basic groups: (1) those that develop innovation strategies, introducing, with varying degrees of intensity and success, new products and processes, and (2) those that forego innovation altogether. Even among establishments in business services, innovation is not uniformly stressed.

Additional evidence supporting this innovator/non-innovator distinction is found in activities that are strongly correlated with the innovation process. Fifty-seven percent of innovators report engaging directly in research and development—a primary source of innovative ideas in business service industries—compared to only 10% of non-innovators. In terms of protecting investments in intellectual capital—a key component of many innovation strategies—just under one-half of all innovators (46%) report using one or more legal property rights, compared to just 9% of non-innovators.

---

<sup>7</sup> All results reported herein are establishment-weighted to reflect population data.

<sup>8</sup> All comparisons are statistically significant at the 1% level unless otherwise stated.

## 4. Differences Between Innovators and Non-innovators

The remainder of this paper focuses on exploring differences between innovators and non-innovators. It examines strategic differences in the development of business competencies. It then looks at differences in factors that hamper the development of innovations. Both exercises require a clear methodological foundation. We begin by addressing this below.

### 4.1 Comparing Innovators and Non-innovators

The strategic profile developed herein is derived using data from scale-based questions. Innovators and non-innovators are compared using extreme scores—the percentage of respondents that report a factor to be very important, a score of 4 or 5 on a Likert scale. This measure is useful for two reasons. First, it provides the reader with a comparative metric that is highly intuitive—(x)% of businesses in group (a) deem (e.g.) high costs to be a critical factor, compared to only (y)% of respondents in group (b). Second, extreme scores yield robust estimates of the percentage of respondents that felt they were above the midpoint of the distribution—defined as a score of 3—without worrying about distinctions beyond this point.

The use of scale-based metrics raises an immediate concern: non-innovators are more likely than innovators to classify a given factor as ‘not applicable’.<sup>9</sup> One’s convention for handling ‘not applicable’ responses, then, will have a substantial effect on the outcome of any comparative exercise. Table 1 presents response rates for two groups of questions, one dealing with business strategies and the other with the impediments to innovation.

**Table 1.** Response Rates, Select Sections—Establishment-weighted

% of businesses responding to questions on:	Innovators	Non-innovators
Business strategies	97	77
Impediments to innovation	91	47

In each case, respondents are defined as businesses that grade at least one factor within a related set of questions within the 1 to 5 range. Different groups of questions, then, will have different respondent sets. To illustrate, consider the section dealing with innovation impediments. Businesses were asked to evaluate the significance of 18 potential factors that impede innovation activity. Ninety-one percent of the innovative population responded to this section by offering, at minimum, at least a single grade within the 1 to 5 range. Only 47% of the non-innovative population did so.

Focusing on a respondent set, as defined above, affects the characteristics of the non-innovative group under study. It may be the case that respondents are drawn randomly from the non-innovator population, such that the subset of ‘respondent’ non-innovators does not differ systematically from ‘non-respondent’ non-innovators. On net, however, there is much evidence to the contrary. While non-innovative respondents to the impediments section differ little from

<sup>9</sup> For certain questions, the term ‘not relevant’ was used. We use these terms interchangeably.



non-innovative non-respondents in terms of their industry characteristics, clear differences emerge in other areas of firm activity. For example, respondents were more likely to perform R&D and use intellectual property. Probit regression analysis supports these distinctions. Accordingly, then, our focus on respondents truncates the non-innovator distribution, eliminating many of the 'low-activity' businesses from the non-innovator sample. This effect is less evident when one focuses on business strategies, due to a lower incidence of non-response within the non-innovator group. Nonetheless, qualitative differences between respondents and non-respondents are again evident.

In comparing innovative and non-innovative respondents, we have two potential approaches, each a variant of the extreme score metric. At issue is whether the remaining 'not applicable' responses should be treated as legitimate. One approach treats these as valid, giving them a score of zero. This creates a six-point scale ranging from 0 (not applicable) to 1 (low importance) through to 5 (high importance). This approach gives 'not applicable' responses equal weight to those in the 1 to 5 range. In an earlier study of strategic differences between innovators and non-innovators, Baldwin and Johnson (1995) adopt this convention. In this earlier study, the percentage of 'not applicable' responses was relatively small. In the present case, however, the percentage of 'not applicable' responses is considerably greater, particularly within the non-innovative group.

A second approach is to base comparisons solely on responses in the 1 to 5 range. This treats 'not applicable' responses, in effect, as missing or invalid observations. This restricts the calculation of extreme scores to only those businesses that express a *definite opinion* of a factor along a continuum of low to high importance. This approach also allows the respondent set to vary, often significantly, for each of the factors under consideration.<sup>10</sup>

The choice of metric is not without consequence. Consider the evaluation of business strategies. The use of unrestricted extreme scores (the first approach) reveals a much greater strategic intensity on the part of innovators—innovators pursue *all* business strategies more intensively than do non-innovators. These findings, however, presume that 'not applicable' responses should receive a score of zero (and should thus be included in the calculation of extreme scores). This introduces a potential bias, if, among non-innovators, 'not applicable' responses are more likely to represent a form of non-response, rather than a score of zero on a scale of 0 to 5.

Many of the strategic differences between innovators and non-innovators are less evident when we move to more restricted comparisons based solely on those businesses that assign a 1 to 5 grade directly—that is, when we focus on establishments that express a definite opinion of the factor under consideration. In what follows, we examine differences based on this more restrictive metric. This represents the more conservative of the two approaches. We favour this method because the large number of 'not applicable' responses within the non-innovator group makes us uncomfortable when it comes to inferring that they *all* implicitly score these factors as zero. It is worth noting that all strategic differences (favoring innovators) that are statistically

---

<sup>10</sup> That is, the number of firms that grade one factor within the 1 to 5 range (e.g., financial management) may be quite different from the number that grade a second factor within the 1 to 5 range (e.g., using high quality suppliers).

significant using restricted extreme scores (the second approach) remain so in unrestricted comparisons.

#### 4.2 Strategic Differences Between Innovators and Non-innovators

The *Survey of Innovation 1996* investigates the importance given to a set of strategic factors within key functional areas (i.e., marketing, management, production, financing and human resources). Businesses were asked to rate the importance of various factors in each of these areas to the overall success of their firm.

Restricted extreme score estimates are presented in Table 2. Several strategies are pursued more intensively by innovators. Many of these are related to the innovation process.

**Table 2.** Restricted Extreme Scores, Business Strategies—Establishment-weighted

	<i>Innovators</i>	<i>Non-innovators</i>	<i>Differences between extreme scores</i>
Financing:			
Flexibility in meeting unforeseen circumstances	67	62	+
Financial management (costs, cashflow)	73	64	+***
Finding/maintaining capital	63	53	+***
Marketing:			
Using third party distributors	45	37	+
Promoting company or product reputation	76	74	+
Satisfying existing customers	93	92	+
Improving position in existing markets	79	73	+**
Targeting new domestic markets	66	62	+
Targeting new foreign markets	52	39	+***
Management:			
Consensus decision-making	56	62	-
Delegating decision-making	42	49	.*
Using information technology	76	73	+
Continuous quality improvement	80	73	+**
Production:			
Using high quality suppliers	71	72	-
Using computer controlled processes	70	67	+
Reducing production times	65	64	+
Improving efficiency of input use	67	66	+
Human Resources:			
Providing incentive compensation plans	49	40	+**
Recruiting skilled employees	75	63	+***
Training	62	58	+

\*\*\*Significant at 1% level, \*\*significant at 5% level, \*significant at 10% level.

Sound financing strategies are often required for the development of innovation programs. Earlier work (Baldwin and Johnson, 1995) found that innovators place more emphasis on financing than do non-innovators. Our findings support this view. Small businesses that introduce innovations are more likely to cite financial management and capital acquisition/retention as important determinants of their success. There is a sensible explanation for this. Small R&D-intensive firms often experience difficulty acquiring financing (Hall, 1992; Himmelberg and Peters, 1994). This reflects an uncertain return on innovation, particularly in technology-based sectors. In developmental phases, innovation programs yield few hard assets. What is more, many product ideas embody substantial amounts of market and technical risk, and may require concomitant investments in legal property rights. Accordingly, then, one would expect a greater emphasis on developing financial competencies within innovative businesses.

Previous research has shown a close connection between innovation and technology strategies and the development of worker skills (Baldwin and Johnson, 1996; Baldwin et al., 1996). Human resource strategies play a key role in service sector innovation (Baldwin, 1999). In business services, innovators are more likely to stress the recruitment of skilled workers than are non-innovators. The former also attach greater weight to incentive compensation plans. At first blush, differences in training are not apparent. These do emerge, however, when examining human resource activities directly. Innovators are more likely to invest in the development of labour skills—16% of innovators have formal development programs compared to only 4% of non-innovators. The former are also three times as likely to report planned future expenditures in personnel development.

Marketing strategies and innovation are closely related (Baldwin and Johnson, 1995; Johnson et al., 1997). In business services, innovators place more weight on developing foreign markets for their products. They also attach more emphasis to improving positions in existing markets. In terms of managerial strategies, innovators attach greater importance to continuous quality improvement.

## ***5. Obstacles to Innovation***

The gains from innovation have been widely reported. In a study of small and medium sized enterprises, Baldwin et al. (1994) demonstrate that innovators perform better than other firms based on a composite measure of market share, growth, productivity, and profitability. Baldwin and Johnson (1995) found that innovators excel in several areas—including market share and return on investment. Johnson et al. (1997) show that new innovative firms develop financial structures that enhance flexibility and reduce their exposure to risk. Crepon, Duguet and Mairesse (1998) demonstrate that innovation in French firms leads to productivity gains.

Given the benefits that accrue from innovation, one is left to ask why many firms choose not to develop innovation strategies. One possibility is that non-innovators face greater obstacles to innovation, and that these impede the adoption of innovation programs. On this view, the impediments to innovation occur *ex ante*, prior to making substantial investments in the innovation process.



A contrarian view is that the impediments to innovation are, to a greater extent, 'experienced', emerging out of the development of innovation programs. In this sense, innovation mirrors a learning-by-doing process similar to that evident for technology adoption (Baldwin and Rafiquzzaman, 1995). Herein, firms that adopt innovation programs are in a better position to evaluate the factors that hamper the development of new products, processes or organizational forms, while non-innovators, lacking comparable experience, are less likely to find such obstacles consequential.

### 5.1 Differences Between Innovators and Non-innovators

To examine these conflicting views, we compared the significance of various impediments across the innovative and non-innovative groups. Restricted extreme scores are presented in Table 3.<sup>11</sup>

**Table 3.** Restricted Extreme Scores, Obstacles to Innovation—Establishment-weighted

	<i>Innovators</i>	<i>Non-innovators</i>	<i>Differences between extreme scores</i>
Risk:			
High risk related to feasibility	44	39	+
High risk related to market success	50	39	+***
Innovation easily imitated	43	28	+***
Cost:			
Costs difficult to predict	45	43	+
High costs	53	56	-
Long amortization period	44	45	-
Availability of Inputs:			
Lack of equity capital	54	59	-
Lack of outside capital	54	55	-
Lack of skilled labour	37	27	+***
Lack of technical equipment	23	31	-**
Corporate Style:			
Internal resistance	11	16	-
Long administrative approval	11	18	-**

\*\*\*Significant at 1% level, \*\*significant at 5% level, \*significant at 10% level.

A review of the impediments to innovation does not support the general proposition that non-innovators encounter greater obstacles than those that invest in innovation programs. Among establishments that grade impediments in the 1 to 5 range, many of the obstacles to innovation are equally shared, irrespective of innovation status. Technical constraints and long administrative approval constituted slightly greater difficulties for non-innovators.<sup>12</sup>

<sup>11</sup> We focus here on a subset of impediments across several well defined areas – factors pertaining to risk, cost, the availability of inputs, and corporate style. We have omitted a group of 'other factors' from our discussion. Note, however, that a positive (1 to 5) response to any impediment, including this residual group, signaled inclusion in the respondent set discussed in Section 4.1.

<sup>12</sup> Both these results are invalid when comparisons are based on unrestricted extreme scores (i.e., when 'not applicable' responses are included).

Innovators do encounter greater obstacles in several areas. First, two risk-related factors—concerns over market success and imitation—are more consequential within the innovative group. Second, innovators are more likely to report that a lack of skilled labour is a major obstacle. This suggests that such factors are ‘experienced’—while there may be a general appreciation of their importance prior to innovation, these factors acquire more weight as businesses develop innovation competencies.

## 5.2 *Multivariate Analysis*

In this section, we use a multivariate framework to investigate the role that innovation activities and firm strategies play in conditioning the impediments to innovation. This represents, in effect, a more sophisticated test of the learning-by-doing hypothesis. In a learning-by-doing framework, the probability of encountering obstacles will increase as the firm engages in innovation activities. Moreover, if obstacles arise due to a greater *intensity of effort*, then it is also possible that impediment patterns are directly correlated with the development of strategic competencies in several areas—marketing, management, production, human resources, and financing.

### 5.2.1. *Firm Characteristics*

We model the probability of encountering a major impediment as a function of an underlying set of firm characteristics. In our exercise, innovation activities are measured in several ways.

First, we include a binary variable that captures the establishment’s innovation status. It takes a value of 1 if the business reports the introduction of an innovation (product, process, or organizational) and a value of 0 if no innovation is introduced.

Second, we include direct measures of two activities that are strongly correlated with the innovation process—R&D and intellectual property use. Although neither a necessary nor sufficient condition for innovation, R&D plays a critical role in the development of innovations, particularly in business services (Baldwin et al., 1998). A binary variable takes a value of 1 if the establishment engages in R&D, and a value of 0 if no R&D activities are reported. The protection of intellectual capital via legal property rights is also characteristic of complex innovation strategies (Baldwin, 1997). We include a variable that takes a value of 1 if the firm reports the use of any legal property right, and a value of 0 if no use of intellectual property is reported.<sup>13</sup>

In service industries, a firm’s investment in human capital and its propensity for innovation are strongly related (Baldwin, 1999). To capture the importance of human capital, we include a final innovation variable—a (0,1) binary variable that takes a value of 1 if the business performs formal training.

---

<sup>13</sup> The legal property rights under consideration included *inter alia* copyrights, patents, industrial designs, trade secrets, and trademarks.

A second group of variables addresses the role that strategic factors play in conditioning the impediments to innovation. Strategic factors are proxies for the development of competencies. It is our hypothesis that more active innovative businesses are more likely to run into obstacles. As we have shown in Section 4.2, innovators are more likely to stress financing and human resource strategies than are non-innovators. The former are thus more likely to develop competencies in these areas. Accordingly, greater activity is modeled here not simply as innovation activity, but also by the emphasis that businesses place on developing complementary skills.

In a learning-by-doing framework, businesses that develop strategic competencies are more likely to report obstacles. We use a series of (0,1) binary variables to measure strategic intensity in five areas—human resources, production, marketing, management, and financing. If, within a given area, the establishment scores an average of 4 or better across the set of factors under consideration, the corresponding binary variable takes a value of 1. For example, the human resource variable takes a value of 1 if the establishment reports a combined score of 12 or more (out of a possible 15) for the following factors: training, recruiting skilled employees and providing incentive compensation plans.

A final set of variables addresses the role of industry characteristics. Industry effects are modeled using four different (0,1) binary variables, representing each of the four business service industries under study (computer services, computer equipment maintenance and repair, engineering, and other scientific & technical services).

### ***5.2.2. Dependent Variables***

Dependent variables are constructed in the following manner. For each of the four groups of impediments under study—risk-related, cost-related, input restrictions, and corporate style—we create a dichotomous dependent variable that takes a value of 1 if the establishment assigns a score of 4 or 5 to any factor within the group, and a value of 0 if otherwise. For example, the dependent variable for risk-related impediments takes a value of 1 if the establishment reports a score of 4 or 5 for any of the three risk-related factors under consideration: feasibility, market success or imitation.

### ***5.2.3. Regression Analysis***

We use a probit model to evaluate the relationship between the impediments to innovation and our set of firm characteristics. The sample group is defined as establishments that responded to both the impediments and business strategies questions.<sup>14</sup> The regression coefficients are calculated against a reference group that is non-innovative, in the scientific and technical services industry, performs no R&D, uses no intellectual property, has no formal training

---

<sup>14</sup> Respondent sets are defined in accordance with the method outlined in Section 4.1—establishments had to grade at least one factor within a set of related questions (e.g., the various business strategies) within the 1 to 5 range. This restricts the regression to 1799 possible units, or 70% of the sample. Within this group, innovators are better represented than non-innovators, comprising 59% of the respondent population. The possibility of correcting for non-response using a Heckman procedure is, at the time of writing, being investigated.



program, and does not emphasize business strategies in any of the areas outlined above. Results are presented in Table 4.

**Table 4.** Probit Regression Results—Establishment-weighted

	<i>RISK-RELATED OBSTACLES</i> (1)	<i>COST-RELATED OBSTACLES</i> (2)	<i>AVAILABILITY OF INPUTS</i> (3)	<i>CORPORATE STYLE</i> (4)
Intercept	-1.059***	-0.494***	-0.634***	-1.623***
Activities:				
Innovator	0.405***	0.163	-0.085	-0.179
RD User	0.300***	0.186*	0.265**	0.090
IP User	0.425***	0.159	0.277**	0.082
Trainer	0.067	0.052	0.132	0.012
Strategies:				
Production	0.224**	0.095	0.071	0.308**
Management	0.150	-0.000	-0.108	0.048
Marketing	0.251**	0.189	0.245**	-0.037
Human Resources	0.075	0.079	0.199*	-0.124
Financing	0.127	0.273***	0.543***	0.185
Industries:				
Computer Services	0.409***	0.125	0.364***	0.316*
Computer M&R	0.246	0.151	0.638	1.044**
Engineering	0.236*	0.113	0.252*	0.373**
Log likelihood	-1055	-1162	-1091	-603
Pr>chi-square	0.000	0.000	0.000	0.148
Number of observations	1770	1768	1768	1768

\*\*\*Significant at 1%, \*\*significant at 5%, \*significant at 10%.

Innovators have a higher probability than non-innovators of encountering difficulties pertaining to market and technical risk (Table 4, column 1). This is also true of businesses that engage in activities that are strongly correlated with the innovation process by either performing R&D or using intellectual property rights. The likelihood of encountering risk-based impediments is also related to certain strategic intensities. Businesses that develop production and marketing competencies have a higher probability of experiencing risk-related obstacles than those that lack commitments in these areas, respectively. Both results are sensible. In a learning-by-doing framework, businesses that invest in production strategies may have better knowledge of the risks associated with the feasibility of process innovations. Similarly, those that stress marketing strategies may express greater concerns over imitation and market success. Industry effects are also apparent. Establishments in computer services and engineering are more likely than those in other industries to report risk-related obstacles.

There are fewer determinants of cost-related problems (Table 4, column 2). There is some evidence that establishments that engage in R&D are more likely to report cost-related impediments. One notable result is that establishments that stress financing strategies are more likely than other businesses to experience cost-related obstacles to innovation.

Generally stronger results are evident in terms of input restrictions (Table 4, column 3). Once again, establishments that perform R&D and use intellectual property are more likely to report input restrictions than are non-performers and non-users, respectively. This reflects the substantial investment—in human capital, technical equipment, and financing—that R&D often requires. Comparable investments in human capital and financing are often required when devising intellectual property strategies. Establishments that demonstrate a commitment to these areas encounter greater barriers.

We find additional evidence at the strategic level. Establishments that stress the importance of marketing, human resource and financing strategies are more likely to report problems associated with input availability than are businesses that do not emphasize these strategies, respectively. Industry effects are again apparent.

Little evidence of systematic determinants exists in relation to corporate style (Table 4, column 4). Of the strategic variables, only production is significant. The fact that innovation activities do not exert any significant effect on impediment probabilities suggests that corporate obstacles, in contrast to risk-related factors or input restrictions, lack a strong learning-by-doing foundation. Once again, some industry effects are evident.

Two basic findings emerge from the multivariate analysis. First, businesses that make substantial investments in the innovation process—either in terms of R&D or intellectual property use—are more likely to encounter risk-related and input-related obstacles to innovation. Both R&D and intellectual property use are hallmarks of complex innovation strategies. This is evidence of learning-by-doing—businesses that engage in complex activities are more likely to encounter impediments.

Second, the obstacles to innovation are not unrelated to the development of strategic competencies. Businesses that stress financing strategies are more likely to experience cost-related impediments and input restrictions. These are sensible findings. Businesses that focus on developing financial competencies may be more knowledgeable of cost requirements or input restrictions pertaining to equity or external capital. Input restrictions—which also include skill shortages—are also more apparent in establishments that stress human resource strategies. In several cases, marketing and production competencies are also positively related to the probability of encountering certain obstacles. These factors provide additional support for the learning-by-doing hypothesis—difficulties arise out of activity, not out of inexperience.

## 6. Conclusion

Innovation and success are complementary. Firms that develop new products, processes and organizational forms often perform better than those that forego innovation. This has led researchers to ask how the strategic profile of innovators differs from other businesses. Our analysis has focused on small establishments in business service industries. These businesses supply core technological inputs to other sectors. Our investigation reveals several key findings.

First, although these services accord with conventional notions of the 'high-tech sector', innovation is not uniformly stressed. Only 40% of businesses innovate, that is, report the introduction of new or improved products, processes or organizational forms. Among innovators, a majority introduce innovations on a regular basis. Among non-innovators, only a small residual (5%) report any non-commercialized innovation activity. The population thus divides into two basic groups: those that develop ongoing innovation programs and those that forego innovation altogether. This is consistent with the conceptual framework proposed by Baldwin and Gellatly (1998) which demonstrates that advanced competencies are more firm- than industry-specific. Even in dynamic sectors, innovation competencies are far from uniform.

Second, innovators attach more importance to financial management, capital acquisition/retention, recruiting skilled labour, and incentive compensation. This provides additional evidence that, among small, R&D-intensive firms, the development of financing and human resource competencies are strongly correlated with the innovation process. Innovators also place more emphasis on foreign expansion than do other businesses.

Third, in many cases, the obstacles to innovation are 'experienced'—they intensify as businesses pursue activities and develop competencies. Concerns over imitation, market success, and labour skills are more significant among innovators. R&D performers and intellectual property users have a higher probability of experiencing risk-related obstacles and input restrictions than do non-performers and non-users, respectively. Similarly, strategic competencies are often directly correlated with the obstacles to innovation.



## References

- Baldwin, J.R. 1997. *Innovation and Intellectual Property*. Catalogue No. 88-515-XPE. Ottawa: Statistics Canada.
- Baldwin, J.R. 1999. *Innovation, Training and Success*. Research Paper No. 137. Analytical Studies Branch. Ottawa: Statistics Canada.
- Baldwin, J.R., W. Chandler, C. Le and T. Papailiadis. 1994. *Strategies for Success: A Profile of Growing Small and Medium-sized Enterprises in Canada*. Catalogue No. 61-523R E. Ottawa: Statistics Canada.
- Baldwin J.R. and G. Gellatly. 1998. *Are There High-Tech Industries or Only High-Tech Firms? Evidence From New Technology-Based Firms*. Research Paper No. 120. Analytical Studies Branch. Ottawa: Statistics Canada.
- Baldwin, J.R., G. Gellatly, J. Johnson and V. Peters. 1998. *Innovation in Dynamic Service Industries*. Catalogue No. 88-516-XPB. Ottawa: Statistics Canada.
- Baldwin, J.R., T. Gray and J. Johnson. 1996 "Advanced Technology Use and Training in Canadian Manufacturing." *Canadian Business Economics* 5: 51-70.
- Baldwin, J.R. and J. Johnson. 1995. *Business Strategies in Innovative and Non-Innovative Firms in Canada*. Research Paper No. 73. Analytical Studies Branch. Ottawa: Statistics Canada.
- Baldwin J.R. and J. Johnson. 1996. "Human Capital Development and Innovation: A Sectoral Analysis," in Peter Howitt (ed.) *The Implications of Knowledge-Based Growth for Micro-Economic Policies*. Calgary: University of Calgary Press.
- Baldwin, J.R. and Z. Lin. 1999. *Impediments to Advanced Technology Adoption for Canadian manufactures*. Manuscript.
- Baldwin, J.R. and M. Rafiquzzaman. 1995. *Selection versus Evolutionary Adaptation: Learning and Post-entry Performance*. Research Paper No. 72. Analytical Studies Branch. Ottawa: Statistics Canada.
- Crepon, B., E. Duguet and J. Mairesse. 1998. *Research Investment, Innovation, and Productivity: An Econometric Analysis at the Firm-Level*. No. 98.15. Cahiers Economics and Mathematics. University of Paris I-Panthéon-Sorbonne.
- Hall, B.H. 1992. *Investment and Research and Development at the Firm Level: Does Source of Financing Matter?* Working Paper No. 4096. National Bureau of Economic Research. Cambridge, Mass.

Himmelberg, C.P. and B.C. Peters. 1994. "R&D and Internal Finance: A Panel Study of Small Firms in High-tech Industries". *Review of Economics and Statistics*, 76: 38-51.

Johnson, J., J.R. Baldwin and C. Hinchley. 1997. *Successful Entrants: Creating the Capacity for Survival and Growth*. Catalogue No. 61- 524-XPE. Ottawa: Statistics Canada.





**ANALYTICAL STUDIES BRANCH  
RESEARCH PAPER SERIES**

- No.
1. *Behavioural Response in the Context of Socio-Economic Microanalytic Simulation, Lars Osberg (April 1986)*
  2. *Unemployment and Training, Garnett Picot (1987)*
  3. *Homemaker Pensions and Lifetime Redistribution, Michael Wolfson (August 1987)*
  4. *Modeling the Lifetime Employment Patterns of Canadians, Garnett Picot (Winter 1986)*
  5. *Job Loss and Labour Market Adjustment in the Canadian Economy, Garnett Picot and Ted Wannell (1987)*
  6. *A System of Health Statistics: Toward a New Conceptual Framework for Integrating Health Data, Michael C. Wolfson (March 1990)*
  7. *A Prototype Micro-Macro Link for the Canadian Household Sector, Hans J. Adler and Michael C. Wolfson (August 1987)*
  8. *Notes on Corporate Concentration and Canada's Income Tax, Michael C. Wolfson (October 1987)*
  9. *The Expanding Middle: Some Canadian Evidence on the Deskillling Debate, John Myles (Fall 1987)*
  10. *The Rise of the Conglomerate Economy, Jorge Niosi (1987)*
  11. *Energy Analysis of Canadian External Trade: 1971 and 1976, K.E. Hamilton (1988)*
  12. *Net and Gross Rates of Land Concentration, Ray D. Bollman and Philip Ehrensaft (1988)*
  13. *Cause-Deleted Life Tables for Canada (1972 to 1981): An Approach Towards Analyzing Epidemiological Transition, Dhruva Nagnur and Michael Nagrodski (November 1987)*
  14. *The Distribution of the Frequency of Occurrence of Nucleotide Subsequences, Based on Their Overlap Capability, Jane F. Gentleman and Ronald C. Mullin (1988)*
  15. *Immigration and the Ethnolinguistic Character of Canada and Quebec, Réjean Lachapelle (1988)*

16. *Integration of Canadian Farm and Off-Farm Markets and the Off-Farm Work of Women, Men and Children*, **Ray D. Bollman and Pamela Smith** (1988)
17. *Wages and Jobs in the 1980s: Changing Youth Wages and the Declining Middle*, **J. Myles, G. Picot and T. Wannell** (July 1988)
18. *A Profile of Farmers with Computers*, **Ray D. Bollman** (September 1988)
19. *Mortality Risk Distributions: A Life Table Analysis*, **Geoff Rowe** (July 1988)
20. *Industrial Classification in the Canadian Census of Manufactures: Automated Verification Using Product Data*, **John S. Crysdale** (January 1989)
21. *Consumption, Income and Retirement*, **A.L. Robb and J.B. Burbridge** (1989)
22. *Job Turnover in Canada's Manufacturing Sector*, **John R. Baldwin and Paul K. Gorecki** (Summer 1989)
23. *Series on The Dynamics of the Competitive Process*, **John R. Baldwin and Paul K. Gorecki** (1990)
  - A. *Firm Entry and Exit Within the Canadian Manufacturing Sector.*
  - B. *Intra-Industry Mobility in the Canadian Manufacturing Sector.*
  - C. *Measuring Entry and Exit in Canadian Manufacturing: Methodology.*
  - D. *The Contribution of the Competitive Process to Productivity Growth: The Role of Firm and Plant Turnover.*
  - E. *Mergers and the Competitive Process.*
  - F. *n/a*
  - G. *Concentration Statistics as Predictors of the Intensity of Competition.*
  - H. *The Relationship Between Mobility and Concentration for the Canadian Manufacturing Sector.*
24. *Mainframe SAS Enhancements in Support of Exploratory Data Analysis*, **Richard Johnson, Jane F. Gentleman and Monica Tomiak** (1989)
25. *Dimensions of Labour Market Change in Canada: Intersectoral Shifts, Job and Worker Turnover*, **John R. Baldwin and Paul K. Gorecki** (1989)
26. *The Persistent Gap: Exploring the Earnings Differential Between Recent Male and Female Postsecondary Graduates*, **Ted Wannell** (1989)
27. *Estimating Agricultural Soil Erosion Losses From Census of Agriculture Crop Coverage Data*, **Douglas F. Trant** (1989)

28. *Good Jobs/Bad Jobs and the Declining Middle: 1967-1986*, **Garnett Picot, John Myles, Ted Wannell** (1990)
29. *Longitudinal Career Data for Selected Cohorts of Men and Women in the Public Service, 1978-1987*, **Garnett Picot and Ted Wannell** (1990)
30. *Earnings and Death-Effects Over a Quarter Century*, **Michael Wolfson, Geoff Rowe, Jane F. Gentleman and Monica Tomiak** (1990)
31. *Firm Response to Price Uncertainty: Tripartite Stabilization and the Western Canadian Cattle Industry*, **Theodore M. Horbulyk** (1990)
32. *Smoothing Procedures for Simulated Longitudinal Microdata*, **Jane F. Gentleman, Dale Robertson and Monica Tomiak** (1990)
33. *Patterns of Canadian Foreign Direct Investment Abroad*, **Paul K. Gorecki** (1990)
34. *POHEM - A New Approach to the Estimation of Health Status Adjusted Life Expectancy*, **Michael C. Wolfson** (1991)
35. *Canadian Jobs and Firm Size: Do Smaller Firms Pay Less?*, **René Morissette** (1991)
36. *Distinguishing Characteristics of Foreign High Technology Acquisitions in Canada's Manufacturing Sector*, **John R. Baldwin and Paul K. Gorecki** (1991)
37. *Industry Efficiency and Plant Turnover in the Canadian Manufacturing Sector*, **John R. Baldwin** (1991)
38. *When the Baby Boom Grows Old: Impacts on Canada's Public Sector*, **Brian B. Murphy and Michael C. Wolfson** (1991)
39. *Trends in the Distribution of Employment by Employer Size: Recent Canadian Evidence*, **Ted Wannell** (1991)
40. *Small Communities in Atlantic Canada: Their Industrial Structure and Labour Market Conditions in the Early 1980s*, **Garnett Picot and John Heath** (1991)
41. *The Distribution of Federal/Provincial Taxes and Transfers in Rural Canada*, **Brian B. Murphy** (1991)
42. *Foreign Multinational Enterprises and Merger Activity in Canada*, **John Baldwin and Richard Caves** (1992)
43. *Repeat Users of the Unemployment Insurance Program*, **Miles Corak** (1992)



44. *POHEM -- A Framework for Understanding and Modeling the Health of Human Populations*, **Michael C. Wolfson** (1992)
45. *A Review of Models of Population Health Expectancy: A Micro-Simulation Perspective* **Michael C. Wolfson and Kenneth G. Manton** (1992)
46. *Career Earnings and Death: A Longitudinal Analysis of Older Canadian Men*, **Michael C. Wolfson, Geoff Rowe, Jane Gentleman and Monica Tomiak** (1992)
47. *Longitudinal Patterns in the Duration of Unemployment Insurance Claims in Canada*, **Miles Corak** (1992)
48. *The Dynamics of Firm Turnover and the Competitive Process*, **John Baldwin** (1992)
49. *Development of Longitudinal Panel Data from Business Registers: Canadian Experience*, **John Baldwin, Richard Dupuy and William Penner** (1992)
50. *The Calculation of Health-Adjusted Life Expectancy for a Canadian Province Using a Multi-Attribute Utility Function: A First Attempt*, **J.-M. Berthelot, R. Roberge and M.C. Wolfson** (1992)
51. *Testing The Robustness of Entry Barriers*, **J. R. Baldwin and M. Rafiquzzaman** (1993)
52. *Canada's Multinationals: Their Characteristics and Determinants*, **Paul K. Gorecki** (1992)
53. *The Persistence of Unemployment: How Important were Regional Extended Unemployment Insurance Benefits?* **Miles Corak, Stephen Jones** (1993)
54. *Cyclical Variation in the Duration of Unemployment Spells*, **Miles Corak** (1992)
55. *Permanent Layoffs and Displaced Workers: Cyclical Sensitivity, Concentration, and Experience Following the Layoff*, **Garnett Picot and Wendy Pyper** (1993)
56. *The Duration of Unemployment During Boom and Bust*, **Miles Corak** (1993)
57. *Getting a New Job in 1989-90 in Canada*, **René Morissette** (1993)
58. *Linking Survey and Administrative Data to Study Determinants of Health*, **P. David, J.-M. Berthelot and C. Mustard** (1993)
59. *Extending Historical Comparability in Industrial Classification*, **John S. Crysdale** (1993)
60. *What is Happening to Earnings Inequality in Canada?*, **R. Morissette, J. Myles and G. Picot** (June 1994)

61. *Structural Change in the Canadian Manufacturing Sector, (1970-1990), J. Baldwin and M. Rafiquzzaman (July 1994)*
62. *Unemployment Insurance, Work Disincentives, and the Canadian Labour Market: An Overview, Miles Corak (January 1994)*
63. *Recent Youth Labour Market Experiences in Canada, Gordon Betcherman and René Morissette (July 1994)*
64. *A Comparison of Job Creation and Job Destruction in Canada and the United States, John Baldwin, Timothy Dunne and John Haltiwanger (July 1994)*
65. *What is Happening to Weekly Hours Worked in Canada?, René Morissette and Deborah Sunter (June 1994)*
66. *Divergent Inequalities -- Theory, Empirical Results and Prescriptions, Michael C. Wolfson (May 1995)*
67. *XEcon: An Experimental / Evolutionary Model of Economic Growth, Michael C. Wolfson (June 1995)*
68. *The Gender Earnings Gap Among Recent Postsecondary Graduates, 1984-92, Ted Wannell and Nathalie Caron (November 1994)*
69. *A Look at Employment-Equity Groups Among Recent Postsecondary Graduates: Visible Minorities, Aboriginal Peoples and the Activity Limited, Ted Wannell and Nathalie Caron (November 1994)*
70. *Employment Generation by Small Producers in the Canadian Manufacturing Sector, John R. Baldwin and Garnett Picot (November 1994)*
71. *Have Small Firms Created a Disproportionate Share of New Jobs in Canada? A Reassessment of the Facts, Garnett Picot, John Baldwin and Richard Dupuy (November 1994)*
72. *Selection Versus Evolutionary Adaptation: Learning and Post-Entry Performance, J. Baldwin and M. Rafiquzzaman (May 1995)*
73. *Business Strategies in Innovative and Non-Innovative Firms in Canada, J. Baldwin and J. Johnson (February 1995)*
74. *Human Capital Development and Innovation: The Case of Training in Small and Medium Sized-Firms, J. Baldwin and J. Johnson (March 1995)*
75. *Technology Use and Industrial Transformation: Empirical Perspectives, John Baldwin, Brent Diverty and David Sabourin (August 1995)*

76. *Innovation: The Key to Success in Small Firms*, **John R. Baldwin** (February 1995)
77. *The Missing Link: Data on the Demand side of Labour Markets*, **Lars Osberg** (April 1995)
78. *Restructuring in the Canadian Manufacturing Sector from 1970 to 1990: Industry and Regional Dimensions of Job Turnover*, **J. Baldwin and M. Rafiquzzaman** (July 1995)
79. *Human Capital and the Use of Time*, **Frank Jones** (June 1995)
80. *Why Has Inequality in Weekly Earnings Increased in Canada?* **René Morissette** (July 1995)
81. *Socio-Economic Statistics and Public Policy: A New Role For Microsimulation Modeling*, **Michael C. Wolfson** (July 1995)
82. *Social Transfers, Changing Family Structure, and Low Income Among Children* **Garnett Picot and John Myles** (September 1995)
83. *Alternative Measures of the Average Duration of Unemployment*, **Miles Corak and Andrew Heisz** (October 1995)
84. *The Duration of Unemployment: A User Guide*, **Miles Corak and Andrew Heisz** (December 1995)
85. *Advanced Technology Use in Manufacturing Establishments*, **John R. Baldwin and Brent Diverty** (November 1995)
86. *Technology Use, Training and Plant-Specific Knowledge in Manufacturing Establishments*, **John R. Baldwin, Tara Gray and Joanne Johnson** (December 1995)
87. *Productivity Growth, Plant Turnover and Restructuring in the Canadian Manufacturin Sector*, **John R. Baldwin** (November 1995)
88. *Were Small Producers the Engines of Growth in the Canadian Manufacturing Sector in the 1980s?*, **John R. Baldwin** (October 1996)
89. *The Intergenerational Income Mobility of Canadian Men*, **Miles Corak and Andrew Heisz** (January 1996)
90. *The Evolution of Payroll Taxes in Canada: 1961 - 1993*, **Zhengxi Lin, Garnett Picot and Charles Beach** (February 1996)
91. *Project on Matching Census 1986 Database and Manitoba Health Care Files: Private Households Component*, **Christian Houle, Jean-Marie Berthelot, Pierre David, Cam Mustard, D.Sc., Roos L, PhD and M.C. Wolfson, PhD** (March 1996)



92. *Technology-induced Wage Premia in Canadian Manufacturing Plants during the 1980s* **John Baldwin, Tara Gray and Joanne Johnson** (December 1996)
93. *Job Creation by Company Size Class: Concentration and Persistence of Job Gains and Losses in Canadian Companies*, **Garnett Picot and Richard Dupuy** (April 1996)
94. *Longitudinal Aspects of Earnings Inequality in Canada*, **René Morissette and Charles Bérubé** (July 1996)
95. *Changes in Job Tenure and Job Stability in Canada*, **Andrew Heisz** (November 1996)
96. *Are Canadians More Likely to Lose Their Jobs in the 1990s?* **Garnett Picot and Zhengxi Lin** (August 6, 1997)
97. *Unemployment in the Stock and Flow*, **Michael Baker, Miles Corak and Andrew Heisz** (September 1996)
98. *The Effect of Technology and Trade on Wage Differentials Between Nonproduction and Production Workers in Canadian Manufacturing*, **by John R. Baldwin and Mohammed Rafiquzzaman** (May 1998)
99. *Use of POHEM to Estimate Direct Medical Costs of Current Practice and New Treatments Associated with Lung Cancer in Canada*, **C. Houle, B. P. Will, J.-M. Berthelot, Dr. W.K. Evans** (May 1997)
100. *An Experimental Canadian Survey That Links Workplace Practices and Employee Outcomes: Why it is Needed and How it Works*, **Garnett Picot, Ted Wannell** (May 1997)
101. *Innovative Activity in Canadian Food Processing Establishments: The Importance of Engineering Practices*, **John Baldwin and David Sabourin** (November 1999)
102. *Differences in Strategies and Performances of Different Types of Innovators*, **by John R. Baldwin and Joanne Johnson** (December 1997)
103. *Permanent Layoffs in Canada: Overview and Longitudinal Analysis* **Garnett Picot, Zhengxi Lin, and Wendy Pyper** (September, 1997)
104. *Working More? Working Less? What do Canadian Workers Prefer?*, **Marie Drolet and René Morissette** (May 20, 1997)
105. *Growth of Advanced Technology Use in Canadian Manufacturing During the 1990's*, **by John Baldwin, Ed Rama and David Sabourin** (December 14, 1999)

106. *Job Turnover and Labour Market Adjustment in Ontario from 1978 to 1993*  
by **Zhengxi Lin and Wendy Pyper** (1997)
107. *The Importance of Research and Development for Innovation in Small and Large Canadian Manufacturing Firms*, **John R. Baldwin** (September 24, 1997)
108. *International Competition and Industrial Performance: Allocative Efficiency, Productive Efficiency, and Turbulence*, **John R. Baldwin and Richard E. Caves** (October 1997)
109. *The Dimensions of Wage Inequality among Aboriginal Peoples*, **Rachel Bernier** (December 1997)
110. *Trickling Down or Fizzling Out? Economic Performance, Transfers, Inequality and Low Income*, **Myles Zyblock and Zhengxi Lin** (December 10, 1997)
111. *Corporate Financial Leverage: A Canada - U.S. Comparison, 1961-1996*, **Myles Zyblock** (December 1997)
112. *An explanation of the Increasing Age Premium*, **Constantine Kapsalis** (July 1998)
113. *The Intergenerational Earnings and Income Mobility of Canadian Men: Evidence from Longitudinal Income Tax Data* by **Miles Corak and Andrew Heisz** (October, 1998)
114. *Foreign-Born vs Native-Born Canadians: A Comparison of Their Inter-Provincial Labour Mobility* **Zhengxi Lin** (September 1998)
115. *Living Arrangements and Residential Overcrowding: the situation of older immigrants in Canada, 1991* by **K.G. Basavarajappa** (September 1998)
116. *What is Happening to Earnings Inequality and Youth Wages in the 1990s?* **Garnett Picot** (July 1998)
117. *The Determinants of the Adoption Lag for Advanced Manufacturing Technologies*, **John R. Baldwin and Mohammed Rafiquzzaman** (August 1998)
118. *The Determinants of Survival for New Canadian Firms: A Characteristics-Based Approach* by **John R. Baldwin, Richard Dupuy and Guy Gellatly** (March 1999)
119. *Technology Adoption: A Comparison Between Canada and the United States* by **John R. Baldwin and David Sabourin** (August 1998)
120. *Are There High-Tech Industries or Only High-Tech Firms? Evidence From New Technology-Based firms* by **John R. Baldwin and Guy Gellatly** (December 1998)
121. *A Portrait of Entrants and Exits* by **John R. Baldwin** (June 1999)



122. *In progress* (John Baldwin, David Sabourin)
123. *In progress* (John Baldwin)
124. *New Views on Inequality Trends in Canada and the United States* by Michael C. Wolfson and Brian B. Murphy (August 1998 and October 1999 (paper))
125. *Employment Insurance in Canada: Recent Trends and Policy Changes* Zhengxi Lin (September 1998)
126. *Computers, Fax Machines and Wages in Canada: What Really Matters?* René Morissette and Marie Drolet (October 1998)
127. *Understanding the Innovation Process: Innovation in Dynamic Service Industries* Guy Gellatly and Valerie Peters (December 1999)
128. *Recent Canadian Evidence on Job Quality by Firm Size* Marie Drolet and René Morissette (November 1998)
129. *In progress*
130. *Earnings Dynamics and Inequality among Canadian Men, 1976-1992: Evidence from Longitudinal Income Tax Records* by Michael Baker and Gary Solon (February 1999)
131. *The Returns to Education, and the Increasing Wage Gap Between Younger and Older Workers* by C. Kapsalis, R. Morissette and G. Picot (March 1999)
132. *Why Do Children Move Into and Out of Low Income: Changing Labour Market Conditions or Marriage and Divorce?* by G. Picot, M. Zyblock and W. Pyper (March 1999)
133. *Rising Self-Employment in the Midst of High Unemployment: An Empirical Analysis of Recent Developments in Canada* by Zhengxi Lin, Janice Yates and Garnett Picot (March 1999)
134. *The Entry and Exit Dynamics of Self-Employment in Canada* by Zhengxi Lin, Garnett Picot and Janice Yates (March 1999)
135. *Death and Divorce: The Long-term Consequences of Parental Loss on Adolescents* by Miles Corak (June 9, 1999)
136. *In progress* (Frank Jones)
137. *Innovation, Training and Success* by John Baldwin (October 1999)
138. *The Evolution of Pension Coverage of Young and Older Workers in Canada* by René Morissette and Marie Drolet (December 22, 1999)



139. *In Progress*

140. *In Progress*

141. *In Progress*

142. *In Progress*

143. *Differences in Innovator and Non-Innovator Profiles: Small Establishments in Business Services*  
**Guy Gellatly (December 1999)**



Supplement your print data with

**www.statcan.ca**

*Online catalogue*

*Database access*

*The Daily for news*

*Electronic publications*

*The latest economic indicators*

Statistics to go for Canadians online





